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Regeneration and polarity.—In a paper which has escaped our attention until now (on account of the removal of Dr. McCallum to Arizona), Vöchting[11] takes up again these problems, stimulated by Klebs's report[12] of the surprising ease with which he was able to reverse the polarity of certain willows—the unattained goal of many a previous experimenter. Much of this paper is devoted to a reexamination of Klebs's work, which Vöchting is unable to confirm and against whose conclusions he enters vigorous protest. He finds no evidence that polarity has ever been reversed by any experimental condition; he still holds that it is a special property of the body, founded in the very structure of the egg, and that it is not induced (as Pfeffer thinks) by any external agent. This conclusion seems to be inevitable, when one observes the extremely different positions and conditions under which eggs develop into embryos. In regeneration the various natural or experimental conditions produce each an appropriate effect, according as they cooperate with or oppose or do not affect polarity. In a supplementary note, Vöchting expresses his complete agreement with the conclusions reached by McCallum.[13]

Miss Kupfer also attacks the problems of regeneration,[14] and after reporting in some detail her experimental work, concludes that polarity is less rigid than is generally believed, the "disposition to form roots being much more generalized . . . . and more easily energized than the power to form shoots;" and that regeneration is dependent upon an adequate supply of food.

Not satisfied because various theories of regeneration fail to account for the formation of one or another kind of organ "when each of the conditions previously ssigned as the causes of regeneration has been fulfilled," she proposes a modification of the *Stoff und Form* theory, postulating the existence of localized root-forming and shoot-forming enzymes. To this the same objections apply as to the older form of this theory; but the author has vague hopes that it may be capable of experimental test, though "no results ready for publication have as yet been obtained." One neglected assumption (also made by Goebel) needs quite as thorough investigation as any, namely, that food will accumulate at any point *before* growth begins.—C. R. B.

Ultramicroscopic structure.—Gaidukov continues his studies with the ultramicroscope, describing in a late paper[15] the appearances in starch grains, cell walls, and protoplasm.

After an introduction upon the principles involved in the various forms of the instrument, he reports that he could see in the starch grains concentric or excentric rows of particles, for which he uses NÄGELI'S term micellae. These are separated by spaces which are optically empty or possibly contain amicroscopic matter. On swelling, the micellae separate more and more and lose their regular arrangement. Cell membranes show an essentially similar structure, cellulose walls showing very small pale particles, woody and corky walls, on the contrary, having brilliant and large micellae.

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[11] Vöchting, H., Ueber Regeneration und Polarität bei höhern Pflanzen. Bot. Zeit. 64^1:101–148. *pls. 5–7.* 1906.

[12] Klebs, G. Willkürliche Entwicklungsänderungen bei Pflanzen 96 ff. Jena. 1903.

[13] McCallum, W. B., Regeneration in plants. Bot. Gazette **40**:97 241. 1905.

[14] Kupfer, Elsie, Studies in plant regeneration. Mem. Torr. Bot. Club **12**:195–241. *figs. 13.* 1907.

[15] Gaidukov, N., Ultramikroskopische Untersuchungen der Stärkekörner, Zellmembranen, und Protoplasten. Ber. Deutsch. Bot. Gesells.

Living cytoplasm is a hydrosol complex. The micellae show active Brownian movements, oscillation, wiggling, collision, recession, etc., even when actively streaming. The better nourished the cytoplasm is, the more numerous and closer are the micellae and the less the amplitude of the movements; and *vice versa*. By a thin hydrogel layer, a coagulum formed by the electrolytes present in the water of the cell wall and vacuole, this hydrosol is protected against further injury by coagulation or against excessive solution by water. The healing of this hydrogel layer or ectoplast after taking in or extruding solid particles (as in Amoeba) is explained as due to coagulation of the micellae of the hydrosol at the spot exposed by the break to the action of electrolytes. At the death of the protoplast there arises a hydrogel complex. The nucleus consists of a hydrosol complex poor in water. The chromatophores resemble rather the hydrogel complex. Microsomes consist of several micellae and are comparable to the *Micellarverbänden* of NÄGELI.

So far as these preliminary accounts show, GAIDUKOV is not merely reporting what he sees, but is making many assumptions as to their interpretation.—C. R. B.

Germination of fern and moss spores.—LAAGE[16] has made a somewhat extended study of the germination of fern and moss spores in darkness. By using both organic and inorganic solutions as culture media he was able to germinate *Osmunda regalis* and thirteen out of sixteen species of Polypodiaceae in darkness. Germination and starch formation were obtained in Osmunda grown in distilled water without the influence of light. Fe_2Cl_6 and $FeSO_4$ stimulated germination and cell division in Osmunda in darkness. Of all the Polypodiaceae, sown in darkness, *Pteris aquilina* and *Scolopendrium officinarum* germinated best, and *Asplenium lucidulum* and *Polypodium aureum* not at all. Contrary to the results of HEALD, higher temperatures were found to be detrimental to germination in the absence of light. No chlorophyll was produced in darkness, although reported by SCHILLING. The osmotic effect of the solutions on germinating spores was marked. Abnormal forms of rhizoids developed in distilled water cultures, and in 4 per cent. Knop's solution they were suppressed, while the young prothallia were deformed. A number of instructive tables showing the effect of solutions of different strengths on germination and number of cells produced in darkness are given. Of the mosses, Funaria and Bryum were germinated in darkness by using very attenuated solutions of inorganic

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[16] LAAGE, A., Bedingungen der Keimung von Farn- und Moossporen. Beih. Bot. Centralbl. **21**:77–115. 1907.